

F.Y.B.Sc. (With Credits)-Regular-Semester 2012 Sem II
**2S-PHY 201 - Physics Paper - I (Electrostatics, Magnetostatics and
Semiconductor Devices)**

P. Pages : 3

Time : Three Hours



GUG/W/16/5587

Max. Marks : 50

- Given :
- i) $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ CVm}^2 / \text{C}^2$
 - ii) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C} / \text{Nm}^2$
 - iii) Charge on electron = $1.6 \times 10^{-19} \text{ C}$
 - iv) Charge on proton = $1.6 \times 10^{19} \text{ C}$

Either

1. a) i) What is mean by electric dipole? Derive an expression for electric field intensity due to an electric dipole at a point. 7
- a) On the axial line
 - b) On the equatorial line.
- ii) Calculate the intensity of the electric field due to an electric dipole of dipole moment 3.5×10^{-10} coul. meter at a distance of 1.5 meter from it on 3
- i) dipole axis
 - ii) Equatorial line

OR

- b) i) State and prove Gauss's theorem. 4
- ii) Apply Gauss law to calculate the electric field intensity due to uniformly charged hollow cylinder at a point out side & inside the hollow cylinder. 5
- iii) A sphere of radius 5cm has a point charge $17.7 \mu\text{c}$ located at its center. Find the electric flux through it. 1

Either

2. a) i) Explain the terms 3
- a) angular momenta.
 - b) gyromagnetic ratio.
- ii) Derive an expression for force on a straight conductor carrying in magnetic field. 4
- iii) A 10 cm long wire carrying current of 10 Amp. is located with an angle of 30° along the direction of uniform magnetic field of strength 1 wb/m^2 . Calculate the force. 3

OR

- b) i) What is rectifier? Explain the working of full wave rectifier using two p-n junction diodes. Hence obtain average value, r.m.s. value and efficiency of a full wave rectifier. 8

ii) show that the ripple factor of a full wave rectifier is 0.48. 2

Either

3. a) State and explain Coulomb's law in vector form. 2½
- b) Derive the expression for capacity of parallel plate capacitor with dielectric substance between the plates. 2½
- c) A current of 10 Amp is flowing through a coil of radius 0.5 m and 10 turns. calculate the magnetic moment of the coil. 2½
- d) Derive the dc value of output current (I_{dc}) of half wave rectifier. 2½

OR

- e) Define electric field intensity. Obtain expression for electric field intensity due to a point charge. 2½
- f) Two parallel plates having equal and opposite charge are separated by a slab 3cm thick having dielectric constant 5. If electric field intensity is 10^6CV/C . Calculate displacement and polarization vector. 2½
- g) Derive the torque acting on a current loop placed in an uniform magnetic field. 2½
- h) What is LED? Explain its construction. 2½

Either

4. a) A charge of $10\sqrt{2}C$ is located at $(3\hat{i} + 4\hat{j} + 5\hat{k})m$. Calculate the electric field at a point having position vector $(5\hat{i} + 4\hat{j} + 3\hat{k})m$. 2½
- b) Prove that $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$. 2½
- c) Explain self and mutual inductance with their SI unit. 2½
- d) Explain the term intrinsic and extrinsic semiconductor. 2½

OR

- e) Obtain the expression for torque of an electric dipole in an uniform electric field. 2½
- f) What are polar and non-polar molecules with examples. 2½
- g) In a ideal transformer, the ratio of number of turns in primary to secondary is 1:20 when it is connected to a supply of 200V ac. Find the voltage across secondary and the ratio of I_P/I_S . 2½
- h) Explain the working of π -section filter. 2½

5. Solve **any ten** of the followings.
- a) What are the limitations of Coulomb's law. 1
 - b) Define electric dipole moment. Give its SI unit. 1
 - c) Define electric potential. 1
 - d) Define capacitance of a capacitor. 1
 - e) What is polarization? 1
 - f) Define dielectric constant. 1
 - g) State Amper's law. 1
 - h) State any two losses in transformer. 1
 - i) Define magnetic dipole moment. Give its SI unit. 1
 - j) Draw circuit diagram of zener diode as a voltage regulator. 1
 - k) What is L – section filter? 1
 - l) What is solar cell? Draw its symbol. 1
